

BURNET (S. M.)

A CASE OF
CHOROIDITIS EXSUDATIVA,

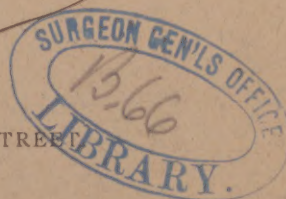
ACCOMPANIED WITH
PARTIAL MICROPSIA, METAMORPHOPSIA, AND CHRO-
MATOPIC SCOTOMATA OF SINGULARLY
REGULAR FORMS.

BY
SWAN M. BURNETT, M.D., WASHINGTON, D. C.,
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*Reprinted from the ARCHIVES OF OPHTHALMOLOGY AND OTOTOLOGY, Vol. 6,
Nos. 3 and 4.*

Compts of Author

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A CASE OF CHOROIDITIS EXSUDATIVA, ACCOMPANIED WITH PARTIAL MICROPSIA, METAMORPHOPSIA, AND CHROMATOPSIC SCOTOMATA OF SINGULARLY REGULAR FORMS.

BY SWAN M. BURNETT, M.D., WASHINGTON, D. C.

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Ophthalmic Surgeon to the Central Dispensary.

Miss F. L., a highly intelligent and cultivated lady of 35 years, consulted me for the first time on the 5th of Sept., 1876. She represented that her eye trouble had been first observed by her about two months previously. For some days she had noted one or two dark spots before the right eye, but one afternoon, after having been engaged in ironing continuously for some time on some fine articles which required close attention, the central spot became brilliantly colored, and its outlines assumed those of a perfect hexagon. Concentric with this hexagon were two other inner hexagons, separated distinctly from each other. Each of these individual figures displayed the colors of the spectrum, beginning with the red at the periphery, and ending on the inner edge with the violet. During the night following, the brilliancy of these colors was such as to disturb her rest materially. She, however, suffered no pain worthy of mention.

In the course of the next few days, this figure gradually assumed another form—that of a four-petalled flower, which soon became scalloped around the edges in a remarkably regular manner. This figure was situated on a dark background, which had the form of the hexagon just mentioned, with its corners somewhat rounded. There were likewise three of these figures concentrically arranged, and the order of colors was the same as in the hexagon. The intensity of the colors, however, was somewhat lessened, except at the scalloped edges, where it was very brilliant indeed. Gradually, this figure took the form of a perfect Latin cross, which in time rounded off at the ends and broke up in the middle. The colors had, by this time, become dull and

no longer followed any regular order. Subsequently, the scotomata grew more irregular.

The above description was aided by figures drawn by the patient herself, who is an artist, and may be considered as representing as accurately as is possible the outlines of the scotomata as they appeared to her.

The scotoma, when projected on a wall 20 ft. distant, was about 12 inches in diameter, and was situated a little above the point of fixation. In addition, she noticed, sometime after the appearance of the scotoma, that objects and especially straight lines appeared distorted. When looking at the face of an individual, for example, the eyebrows would appear to run sharply downward at the nose, and the palpebral aperture to run sharply upward, so as to almost meet.

At the time I first saw her, the scotoma had the appearance of a cross, the right side of which was covered by a crescent. Vision was not materially impaired, as with $-1\text{ D }(\frac{1}{38})$ she read S. XX. at 20 feet, and also read J. 1 at 12 inches, though the eye became easily fatigued and irritated under the attempt to use it. The distortions of the printed lines of the page, too, were a source of great annoyance. The lines were wavy in appearance, and seemed to converge toward a point a little above the fixation point, and the letters at this point, or in its immediate vicinity, were about one-third smaller than those more peripherally situated. This distortion extended over the space of 4 lines of J. No. 4, held at 12 inches (30 cm.) from the eye. Just at the very centre of this space, there was a dense scotoma covering the extent of two or three letters.

The ophthalmoscope showed all the media to be clear; the disc of a more pinkish hue than normal, with an unusual number of small vessels on its surface; the veins tortuous. At the lower and inner quadrant, and at about 3 disc diameters from the disc, was a deposit of pigment of the size of the diameter of a medium retinal vein, and about midway between this and the macula lutea was another of approximately the same size.

The most marked changes, however, were observed in the immediate vicinity of the macula itself. Here there was a very considerable derangement of the choroidal pigment. A little below the macula, the pigment was massed together, and surrounded by a reddish zone—the congested stroma of the choroid denuded of its epithelial covering.

This disturbance in the pigment extended over a space about one-third the size of the optic disc.

The left eye was amblyopic ($V = \frac{20}{200}$) and deviated outward. This amblyopia had existed, she said, all her life, and as there had never been any disease in that eye as far back as she can remember, she looked upon it as being congenital. This view is further supported by the fact that a sister, an aunt, and two cousins have likewise an amblyopia in the same eye, also congenital. In none of these, however, is there any strabismus. The changes in the fundus of this eye (and there were none observable elsewhere) were : a marked diminution in the calibre and number of retinal vessels as compared with the other eye, and a grayish-blue atrophy of the central portion of the optic disc. A narrow rim at the periphery of the disc retained its normal pink color.

Her general health has always been fair, and at the time of the commencement of the present trouble she noted nothing specially abnormal in her condition. The menstrual function has been always regular. Such is the character and standing of the individual that there could be no suspicion of syphilis, and besides, the closest inquiry failed to bring out any facts leading to such a view.

Under the use of a mercurial course, together with protection of the eyes by smoked glasses, the symptoms gradually subsided, so that by the first of November the micropsia and metamorphopsia had almost entirely disappeared and the scotoma was only seen when called up by exposure to a strong light. I have since learned, by letter (Feb. 2d), that all these symptoms have wholly subsided.

It may be mentioned, in conclusion, that there were small scotomata corresponding to the points of pigment observed in the other parts of the fundus, but they were so peripherally situated as to occasion no annoyance.

REMARKS.

The foregoing case is of interest from several points of view.

In the first place, the *choroiditis exsudativa* is, so far as we are able to learn, strictly *idiopathic*. None of the causes which we generally find in operation to produce this pathological condition, such as syphilis, etc., were present. There was not even a derangement of the menstrual function, a condition which

might, through disturbance of the equipoise of the circulation, cause an extravasation of blood or other fluid under the retina or into the stroma of the choroid, and thus give rise to the phenomena we have noted.

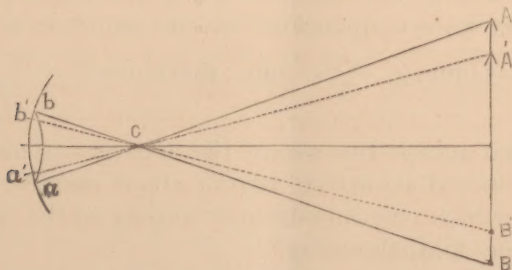
The *micropsia* and *metamorphopsia*, though not exceedingly rare conditions as accompaniments of exudations under the retina, are yet not sufficiently common to be passed by without some consideration.

It is known that Förster (*Oph. Beiträge*, 1862) was the first to investigate closely the subject of metamorphopsia attendant upon changes in the choroid or retina, whereby the percipient elements of the retina are displaced from their normal positions. These investigations, however, were confined, for the most part, to those cases where there had been a *crowding together* of the elements through contraction; those instances where the elements were subject to *separation* receiving only brief mention. The cases of Mooren, too, from the short account he has given of them (*Oph. Beobachtungen*, 1867), depended upon cicatricial contraction of the choroid, and with it the retina. Knapp also mentions (*Zehend. Monatsbl.*, II., p. 307) that the majority of cases, that had up to that time come under his observation, were dependent upon partial choroidal atrophy, and consequently, we take it, upon contraction and *crowding* of the retinal elements. In the first number of these ARCHIVES, however, he communicates a case, in a study of choroidal ruptures, where the contraction had the opposite effect, and the elements were drawn asunder. Prof. Becker, in the same number, records a micropsia and metamorphopsia from dissociation of the retinal elements, caused by a circumscribed extravasation of liquid under the retina in retinitis leucemica. And in a later work, Förster himself (*A. für Oph.*, XX., Ab. 1) reports several cases which he has observed in connection with syphilitic chorioiditis, where the retinal elements were separated by an exudation underneath them.

The manner in which metamorphopsia, macropsia, and micropsia are produced by the dislocation of the retinal elements finds a ready explanation in the empiristic theory of

vision. Knapp, in the paper last referred to (ARCHIVES OF OPH. AND OTOTOLOGY, vol. I., No. 1), considers its mechanism in the case of contraction and separation; and Kaiser (*Archiv für Oph.* XIX. 2) gives an exposition of the theory in its application to both micropsia and macropsia; and in contradistinction to these conditions, as they are sometimes found in paresis or paralysis of the ocular muscles, more especially the muscle of accommodation, he suggests the name of *partial metamorphopsia* (micropsia and macropsia) for the instances like those under discussion, where the producing cause lies in the shifting of the retinal elements, and is limited to a restricted portion of the visual field.

A reference to the accompanying figure will at once make



clear the manner of production of micropsia in those cases, like the one we have just reported, where the retina has been pushed forward, so as to become convex on its inner surface, instead of being concave, as it is when in its normal position. The image of the object AB is formed on the elevated and stretched retina at $a b$. The retinal elements at a and b occupied normally the positions $a' b'$, and from education have always been accustomed to project impressions received on them in the directions $a' A'$ and $b' B'$. They still project their impressions in the same manner, and as a consequence, instead of AB, we have the smaller projected image, $A' B'$. The metamorphopsic appearances as denoted by the wavy appearance of the lines find their explanation in the same cause, though here, the elements being displaced irregularly, the

impressions made on them are, of course, projected in an irregular manner.

These distorted appearances should correspond, if the above theory is true, approximately at least, with the anatomical disturbances in the fundus, made manifest by the ophthalmoscope. Upon examination, we have found this to be the case. The size of the choroidal exudation, as nearly as we could estimate it, was about one-third the breadth of the optic disc. The breadth of the distorted image, when projected at 30 cm., was about 10 mm. Now, according to the known formula, $\beta = \frac{B \cdot g''}{g'}$; in which β represents the size of the retinal image, B that of the object; g'' the distance from the nodal point of the eye to the retina; and g' the distance from the nodal point to the object. The known quantities in the equation are: $B = 10$ mm., $g'' = 15$ mm., $g' = 300$ mm.; therefore $\beta = \frac{10 \times 15}{300} = 0.5$ mm.

Now, if we accept the size of the o. d. as 1.56 mm., we will have the affected choroidal region about one-third the size of the disc, which corresponds very closely to the appearances shown by the ophthalmoscope.

The view that the metamorphopsic and micropsic appearances presented in this case are due to an elevation of the retina and a dissociation of its elements receives further strong support from the fact that, with the subsidence of the exudation, the elements returned to their normal positions and remain in unimpaired possession of their powers, if we are to accept as evidence of this subsidence the complete disappearance of the subjective symptoms, and the normal acuteness of vision now present. But we must bear in mind that, even after the exudation has disappeared, the healing of the choroidal disease may be attended by a *contraction with separation* of the elements again, and a return of the metamorphopsia. This secondary contraction and separation was the cause of the micropsia in the case detailed by Knapp in the first number of these ARCHIVES, and evidently was considered by Gräfe to be the cause of the same

phenomenon, in a case mentioned by him in Vol. XII., No. 2, p. 215, *A. für Oph.*, since he found it to be the "remains of the functional disturbance." It would be of interest to note the condition of vision in those cases of contraction, after the lapse of considerable time, in order to determine if the retinal elements have become adapted to their new positions, and project impressions from these instead of from the places they formerly occupied.

Simply as a contribution to the statistics of micropsia accompanying exudations under the retina, I will relate briefly a case I saw in the clinique of Abadie in Paris, in March, 1876.

It was in the person of a young man who was suspected of being affected with syphilis. With the right eye, the letters of Snellen's test types appeared to him but little more than half as large as with the left eye. Abadie at first thought it due to trouble in the accommodation, but examination proved this not to be the case. The ophthalmoscope showed marked changes in the fundus. Just below the disc there were, on either side of the principal vein, two extravasations of blood exceeding in size the diameter of the vein. At the macula, there were appearances very similar to those seen in the case reported by us. The pigment was much disturbed, and just in the centre of this disturbance there was a small triangular spot of a yellowish-red color. I much regret that circumstances prevented my making a more thorough examination of the case.

But the most remarkable feature of the case, perhaps, is the *extraordinarily regular forms which the scotoma assumed during its various changes*. It is true, we have no other evidence of this than the statement of the patient, but her high intelligence, and the fact that she described accurately the other appearances, such as the micropsia, metamorphopsia, the position of these in the visual field, etc., all of which were in strict accord with what we would expect from the ophthalmoscopic appearances, leads us to accept her unprovable statement in regard to those scotomata also.

Förster, in the paper already alluded to (*Gräfe's Archiv*, XX. 1), is the only author, so far as my research extends, who notices these phenomena. In his cases, as in ours, they were

accompaniments of *choroiditis exsudativa*. He says that many patients with this affection complain of subjective appearances of light of a very definite character, and that they are generally, if not always, found in the vicinity of the fixation-point. They consist of bright transparent spots, discs, circular or oval rings, and generally have a flickering, tremulous, or rolling movement. The appearances change, in some instances, from one form into another, but in none does he mention that regularity of outline which our patient delineates. In some, but not in a large proportion of cases, there was a small defect in the visual field. He also noted a circumstance which was very marked in our case, namely, an extreme impressibility to bright light—not manifested in the sense of a photophobia, but as a dazzling and confusing brightness, which was particularly disagreeable, as it called into fresh vividness the chromatopsic figures. After a walk in the bright sun-light and after an ophthalmoscopic examination, the outlines of the figures were much sharper, and the colors were much deeper in intensity. Even after these subjective sensations were no longer present under ordinary conditions, an exposure of the eye to a bright light would call them up.

As to the cause of these appearances, Förster thinks them due to an alteration in the circulation of the choroid or retina. He says: "These symptoms can, indeed, only be referred to the condition of the circulation of the choroid or retina, not to irritation of the nervous elements by an exudation or the like."

Now, whilst this explanation may be applicable to the cases which Förster reports, we think it would scarcely hold good in our case. Here the scotoma was of too regular an outline, and even in its changes followed too regular an order to depend solely on derangement in the circulation. An inspection of the figures, as drawn by our patient, showed a succession in the series of forms which could hardly be the result of changes in the condition of the circulation alone. The hexagonal figure which appeared first with such distinctness of outline serves as a background, with a gradual diminishing of its density, to all the succeeding figures, until the scotoma finally lost its

regularity of form altogether. Under either of these hypotheses, it would be difficult to understand how the resulting scotoma could be so sharply defined and regular in its outline, but it seems to me that it would be much more plausible, in view of the facts just stated, to consider it due to pressure on, and consequent irritation of, the retinal elements by the exudation. Other facts, moreover, seem to substantiate this opinion. The position of the scotoma in the visual field corresponded with the locality of the exudation in the fundus, and its estimated size bore a close relation to the estimated extent of this exudation. Her estimation of the size of the scotoma, when projected on a wall 6 metres distant, was about 30 cm. (12 inches). According to the formula previously given, the size of the retinal image $\beta = \frac{B \cdot g''}{g'}$. By substituting the known val-

ues in the equation we have $\beta = \frac{300 \times 15}{6000} = 0.7$ mm.

The calculated size of the retinal image of the metamorphopsia was 0.5 mm., and the estimated size of the exudation was about the same. We would naturally expect, however, that the scotoma would be somewhat larger, since a certain number of elements beyond those shifted from their proper positions would be subject to pressure.

The condition of the left eye is also not without its interest, especially when taken in connection with the family history. That five members of a family should be congenitally amblyopic in one eye can hardly be looked upon as a matter of mere incidence. We have, however, not sufficient data at hand on which to ground even a plausible speculation in regard to its etiology, but evidently some hereditary taint or predisposition must lie at the basis of it. It would be not only of great interest, but also of great clinical importance to collect all facts possible in regard to these cases of congenital amblyopia, so regarded.

NOTE.—May 29th, 1878. In a letter just received from the patient, she says that her vision has continued steadily to improve. The central scotoma is visible now only as an indistinct shadow on first waking in the morning. There is still some slight distortion of lines, and from the description and drawing she sends, I judge that the percipient elements are still separated.

